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Studies of the Auger spectrum from the Si(1 1 1) surface using positron annihilation induced Auger electron spectroscopy

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Abstract

The high-resolution positron-annihilation-induced Auger spectrum from the Si(111) surface displays an Auger signal corresponding to the L2,3VV Auger transition for Si. The Auger signal intensity is used to obtain experimental annihilation probabilities of the surface trapped positrons with relevant Si core electrons. Experimental data is analyzed by performing first-principles calculations of positron surface states and annihilation characteristics for the non-reconstructed and reconstructed Si(111)-(7 x 7) surfaces. Estimates of the positron surface state binding energy, work function, and annihilation characteristics are provided. Calculations show that the positron is getting trapped at the corner hole sites of the reconstructed Si(111)-(7 x 7) surface.

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Keywords

Annihilation, Auger, Binding, Positron, Reconstruction, Silicon, Surface, Trapping, Work function